National Aeronautics and Space Administration

Langley Research Center Site Visit
IT Infrastructure Integration Program (I^3P)

Office of the Chief Information Officer

Cathy Mangum

May 5, 2009

VISION: Integrated, secure, and efficient information technology and solutions that support NASA

Agenda

- Safety and Administrative Remarks
- Site Visit Objectives
- Comments and Questions
- Langley Research Center (LaRC) Overview
- I^3P Overview
- LaRC IT Infrastructure Today
  - End User Environment
  - Communication Environment
  - Data Center Environment
- Summary
- Center Bus Tour

Safety and Administrative Remarks

- In the event of an emergency, please exit through the front doors, convene in the parking lot across the street, and await further instruction
- Restrooms are located in the lobby
- Coffee, tea and water are available at the back of the room
- Soda and snack machines are located through the lounge to my right
- Please adjust all cell phones and pagers to the “Off” or “Vibrate” setting
- During the tour this afternoon
  - Do not use cell phones or cameras to take pictures. Pictures and charts will be available later on the I^3P website (I3P.nasa.gov)

Site Visit Objectives

- What we are planning to do
  - Explain the Center: facilities & people (who we are)
  - Explain involvement with major programs, projects, and missions (what we do)
  - Explain the current state of IT infrastructure at the Center
    - End-user services (desktop/laptop/workstations)
    - Communications (networks, phones)
    - Data centers
- What we are NOT planning to do
  - Explain further the five I^3P acquisitions or associated strategy
  - Explain the content of the draft RFPs
  - Entertain questions on the acquisition strategy or draft RFPs
  - Discuss future state/plans for Center IT infrastructure

Comments and Questions

- Aside from site visit logistics questions, NASA will handle comments and questions as described below.
- Submit comments/questions to http://I3P.nasa.gov [Q/A tab].
- Comments Received by May 20:
  - Sender will receive acknowledgement e-mail.
  - Comments will not be posted online nor to any publicly accessible website but will be considered internally by the government when finalizing the RFP and no response will be provided.
- Questions Received by May 20:
  - Sender will receive acknowledgement e-mail.
  - Questions, in whole, in part, or consolidated with similar questions, will be posted online along with the government's response. Individual and company identifiers will not be used in the online posting.

National Aeronautics and Space Administration

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Office of the Chief Information Officer

Steve Jurczyk
Deputy Center Director

May 5, 2009

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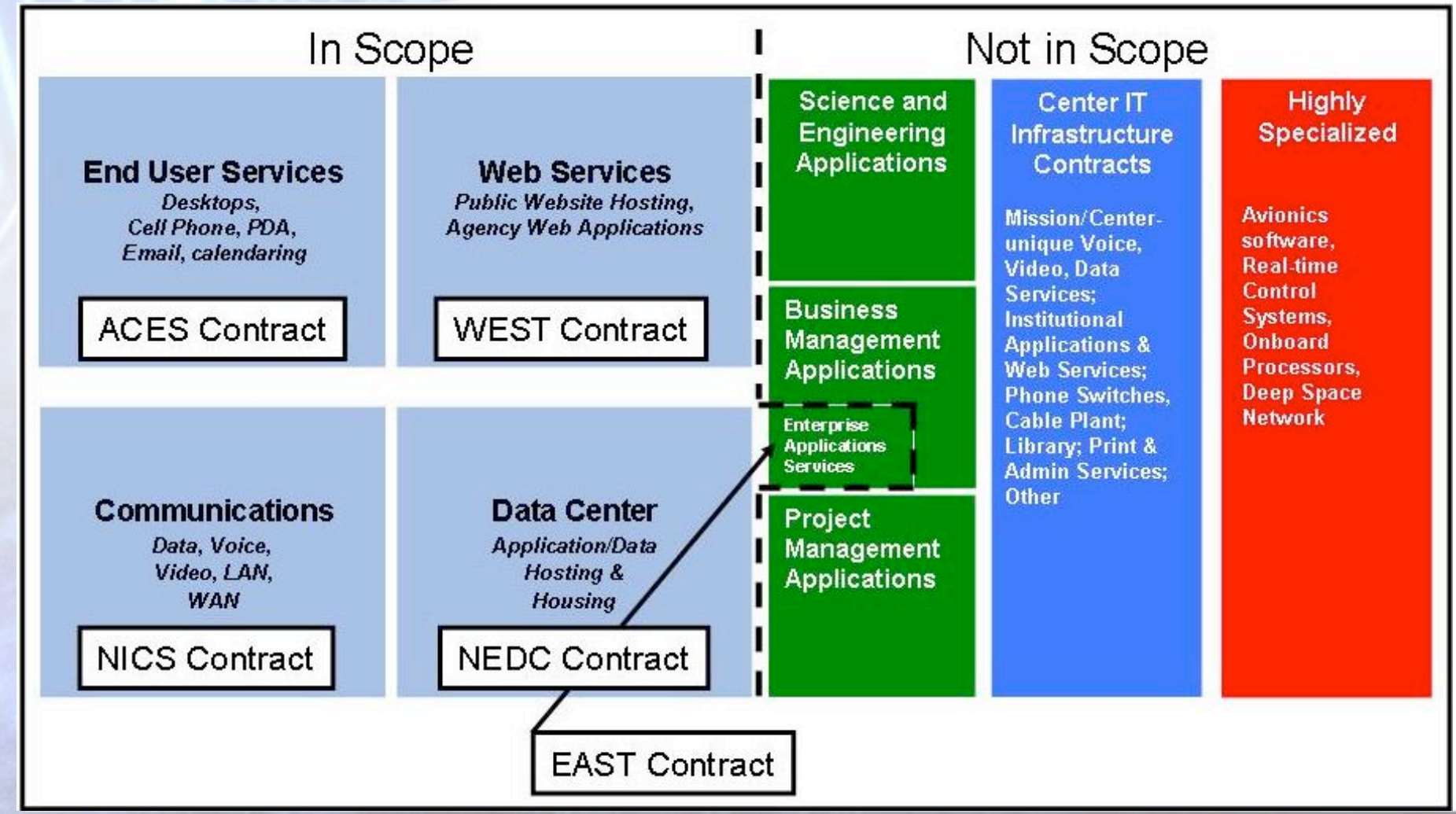
I³P Overview: Why I³P?

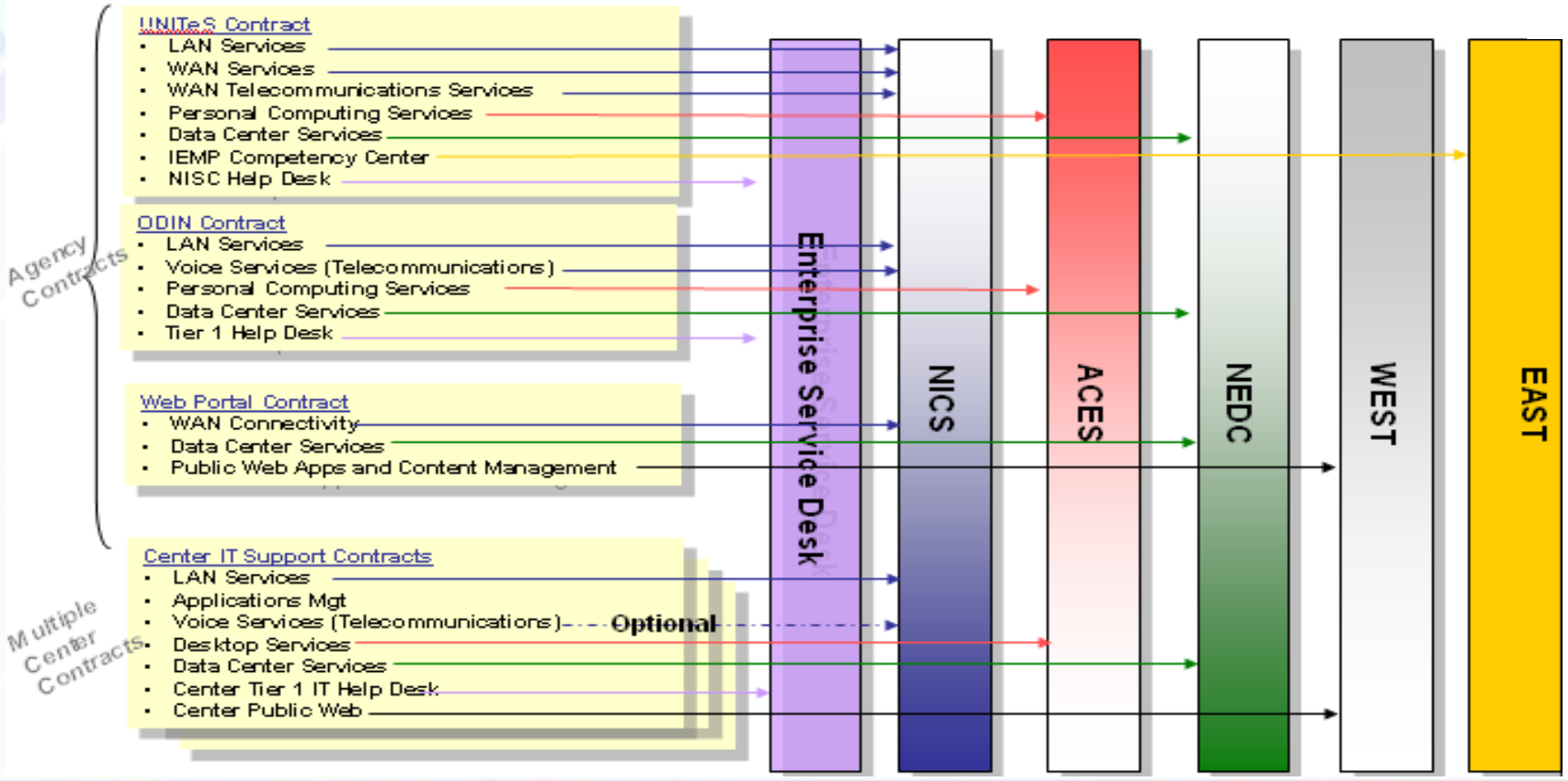
- NASA's commitment to the strategy of Agency-wide IT services and Agency-wide procurement aligns with:
  - NASA's need for IT security, efficiency, and collaboration to support NASA's missions
  - Industry and business best practices
  - New Administration's priorities of effectiveness, efficiency, transparency, participation and collaboration
- What will success look like?
  - Reliable, efficient, secure, and well-managed IT infrastructure that meets or exceeds the customers expectations
  - Systems seamlessly deployed and used across Centers
  - Investing in the right IT solutions that provide the greatest benefit to the NASA mission

I³P Overview: Five Procurements Drive NASA's IT Transformation



I³P Overview: Agency IT Infrastructure Supports Transformation

- Consolidates and requires Centers to use Agency contracts for core IT infrastructure services
- Allows Centers to use Center specific IT support contracts for Non-I³P services
- Uses a single Enterprise Service Desk and Enterprise Service Request System for reporting/tracking Incidents and for requesting I³P defined services
- Primary purpose is to provide better IT security, collaboration, efficiencies to accomplish NASA mission



I³P Overview: Procurement Schedule

Updated April 20, 2009

Milestones	NICS	ACES	NEDC	WEST	EAST
Draft RFP	4/20/09	4/20/09	4/20/09	4/20/09	5/11/09
Industry Days	4/21 and 4/22	4/21 and 4/22	4/21 and 4/22	4/21 and 4/22	4/21 and 4/22
Due Diligence	5/1 to 5/15 – Primary focus is on ACES, NEDC and NICS. NOTE: The EAST site visit will be on 5-20 at MSFC.				
RFP Release *	6/15/2009	6/15/2009	6/15/2009	6/15/2009	6/15/2009
Proposals Due *	7/30/2009	7/30/2009	7/30/2009	7/30/2009	7/30/2009
Contract Start *	May 2010	June 2010	May 2010	June 2010	May 2010

* Dates reflect current schedule posted online.

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LaRC IT Environment

Users
- ~ 1,900 Civil Servants
- ~ 1,800 Contractors
- ~ 250 Students
- + External Partners

IT Spending
- ~$60M annually
- Includes Mission & Mission Support

Systems/Applications
- > 400 applications
- > 4300 NOMAD accounts

Desktop/Workstations
- 50% Windows
- 20% Mac OS
- 30% Unix

Network
- ~9000 network connections
- 10Gb/sec backbone
- Internal: Single internal LAN
- External: Several DMZs
  - Remote access: VPN
  - Public, wireless, and guest networks
- WAN: NISN

Data Center
- Central Server Data Center
  - Central web, database, & application servers
  - Shared mid-range cluster (3000 cores)
  - Central storage system (~1.2PB)
- Atmospheric Science Data Center
- Multiple distributed clusters (>10,000 cores)

Websites (375 total)
- 175 public; 200 internal

LaRC Existing IT Contracts

- Major IT Contracts
  - ODIN
    - Desktops, NADs, email, calendaring, video, etc.
  - ConITS: Consolidated IT Support Contract
    - Specialized system administration and application development

- Other Contracts with IT components
    - ROME: Research Operations and Maintenance
      - Includes operations of wind tunnels and data acquisition systems
    - STARSS: Science, Technology and Research Support Services
      - Provides integrated support to scientific research projects

Major IT Outside of OCIO

- **Science Data Center:** Distributed Active Archive Center (DAAC) performs production science data processing and delivers Earth Sciences Enterprise data to the public, including the various scientific communities
- **System Engineering Laboratories:** Computer Aided Engineering & Design for Mechanics (CAEDM) Laboratory, Data Visualization Laboratory (DVAL) and the Geometry Laboratory (GEOLAB). Support for LaRC research and development programs and projects in aeronautics, atmospheric sensing, space science, and exploration
- **Scientific Laboratories and Workstations:** Used to perform scientific research and solve complex CFD and structures problems
- **Flight Simulation:** Systems support real-time, pilot-in-the-loop flight simulation activities
- **Wind Tunnel Data Acquisition:** Systems to support tunnel-based testing, data capture and analysis

National Aeronautics and Space Administration

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Office of the Chief Information Officer

Susan Lemon

May 5, 2009

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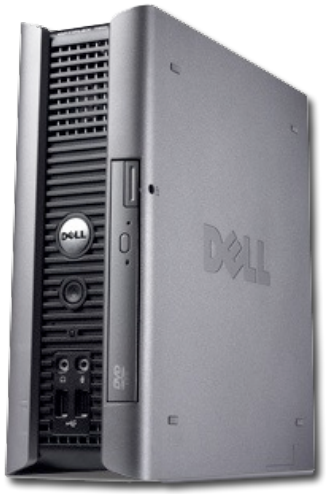
ODIN Desktops and Workstations

Mac

- 198 Desktops
- 72 Workstations



Windows

- 748 Desktops
- 468 Workstations

Linux

- 5 Desktops
- 23 Workstations

ODIN Laptops

Macs

- 264 Laptops

Windows

- 1029 Laptops

Linux

- 4 Linux Laptops

ODIN Systems at LaRC

- 2811 Desktops, Laptops, Workstations) are currently ODIN-provided/supported
  - 2245 Windows (80%)
  - 534 Macintosh (19%)
  - 32 Linux (1%)
- All systems are On-Site
  - 97% (2559 systems) are on the main LaRC campus
  - 3% (75 seats) are on the east side (LAFB)
  - Very mobile workforce (travel, home, alternate work sites)

	Mac	Win	Linux
Desktop			
Standard-	198	748	5
Laptop			
Standard-	257	895	2
Lightweight-	7	69	-
Engineering-	-	35	1
Tablet-	-	30	1
Workstation			
Entry-	62	268	5
Mid-	-	59	2
High-	10	141	16
Totals	**534**	**2245**	**32**

Current Hardware Standards

	Mac	Win/Linux
Desktop		
Standard-	Mac Pro 2.66GHz Quad-Core, 640GB drive, 3GB RAM	Dell Optiplex 760, 3GHz, 160GB drive, 2GB RAM
Laptop		
Standard-	Mac Laptop 15.4" 2.66GHz Core 2 Duo, 320GB drive, 4GB RAM	Dell Latitude E6500, 2.66GHz, 160GB drive, 2GB RAM
Lightweight-	Mac Laptop 13.3' 2.4GHz Core 2 Duo, 250GB drive, 2GB RAM	Dell Latitude E6400, 2.66GHz, 160GB drive, 2GB RAM
Engineering-	*N/A*	Dell Precision M6400 64-bit, 2.93GHz, 250GB drive, 4GB RAM
Tablet-	*N/A*	Fujitsu Lifebook T5010, 2.53GHz, 120GB drive, 2GB RAM
Workstation		
Entry-	Mac Pro, one 2.66GHz Quad Core, 640GB drive, 6GB RAM	Dell Precision T5400, Dual Core 3.33GHz, 250GB drive, 4GB RAM
Mid-	*N/A*	Dell Precision T7400 64-bit, Quad Core 2.66Hz, 2-300GB drives, 4GM RAM
High-	Mac Pro, two 2.66GHz Quad Core, 640GB drive, 6GB RAM	Dell Precision T7400 64-bit, Quad Core 2.66Ghz, 2-300GB drives, 8GM RAM

Hardware Augmentations

- Many systems are ordered with augmentations
  - Increased RAM
  - Larger hard drive
  - Enhanced video card
- Special ordering is also available if end-user's requirements exceed standard/augmented systems
  - Faster processor
  - Faster bus
  - EEO requirements

Hardware Service Levels

- Docking Stations

Laptops with Docking Stations	55%
Laptops without Docking Stations	45%

- Flat Panel Monitors

No Monitor	52%
17" Monitor	26%
19" Monitor	5%
21" Monitor	7%
24" Monitor	10%

Maintenance and Refresh

- Return to Service

Close of Next Business Day	3.0%
8 Business Hours	94.5%
4 Business Hours	2.0%
2 Contiguous Hours	1.0%

- Hardware Refresh

3-Year Refresh	99%
5-Year Refresh	1%

  - Hardware Refresh Cycle
    - 795 systems were refreshed or newly installed 4/2007 – 3/2008
    - 1853 systems were refreshed or newly installed 4/2008 – 3/2009
    - 152 systems are scheduled to be refreshed 4/2009 – 3/2010
    - 11 systems are due for refresh after 3/2010

Back-Up/Restore

- Back-Up & Restore Service

No Centrally-Managed Backup/Restore Service *These systems use other local backup/restore capability*	10%
Daily Backup of User Data	80%
Daily Backup of Entire Main Drive	10%

  - Approximately 5TB of data is backed up every day
  - End users can restore their data themselves or may request assistance
  - The number of requests for restore assistance varies greatly, from none to 10 per week
  - The amount of data per restoration also varies, from one or two files to entire systems

Shared Printers

- Shared Network Print Services

	Centrally-Managed Systems	Other Systems
Within User's Office	9%	1%
Within 30 feet	1%	--
Within 60 feet	84%	73%
Within 150 feet	2%	--
None	4%	26%

  - 570 infrastructure printers provide shared network print services for the Centrally-Managed seats and for LaRC's non-centrally managed desktop systems that subscribe to shared print service with their network connection

- Xerox Multi-Function Devices (MFD)
  - 153 MFDs are installed and managed under the Agency contract.

Standard Software

- PC/Windows
  - Microsoft Windows XP SP3 or XP-64bit SP2
  - MS Office Pro 2007 SP1
  - Internet Explorer 7
  - FireFox
  - Quicktime
  - Adobe Acrobat Reader
  - Entrust 7 (PKI)
  - Flash Player
  - Shockwave Player
  - Windows Messenger
  - FileNet eForms
  - Symantec Anti-Virus
  - Patchlink Agent
  - SMS Client
  - Tivoli Storage Manager Client
  - Timbuktu
  - WinZip
  - Java Run-Time Envir, Sun JRE
  - Windows Media Player

Versions are maintained for compliance with NASA STD-2804, Minimum Software Interoperability Suite, and IT security requirements

Standard Software

- Macintosh

  - Macintosh 10.5 Leopard
  - Microsoft Office Pro 2008
  - Safari
  - FireFox
  - Quicktime
  - Adobe Acrobat Reader
  - Entrust 7 (PKI)
  - Windows Media Player
  - FileNet eForms
  - Symantec Anti-Virus
  - Patchlink Agent
  - LANrev Client
  - Tivoli Storage Manager Client
  - Timbuktu
  - Java Run-Time Envir, Sun JRE
  - Stuff-It Expander –full version

Versions are maintained for compliance with NASA STD-2804, Minimum Software Interoperability Suite, and IT security requirements

System Administration

- All ODIN systems receive system administration service and support with their ODIN seat
- In addition, 18WYE are branch/org-funded for dedicated admin support for the organizations' full seats and related IT requirements above what is provided with their ODIN-managed seats
- Many organizations obtain application support via other LaRC contracts for engineering and scientific applications used on their full seat

Systems Outside the Scope of ODIN at LaRC

- Waivers must be submitted by org/end-user and approved by OCIO for a system to be deemed out-of-scope
- ~1200 workstations/desktops systems used for:
  - Software development
  - Running legacy applications
  - Highly integrated within cluster clouds
  - High-end engineering systems, etc.
- Servers and Clusters
- Data-Acquisition and Data Reduction Systems
- Processors/systems embedded in lab/tunnel facilities

ODIN Mobile Computing Seats

410 Mobile Computing (MC) devices are provided at LaRC via ODIN– service provided by Verizon

303 Blackberries
Storm or Curve
(RIM)

77 Treos
Centro
(Windows-Palm)

29 Windows Mobile

Special requirements for other devices or capabilities can be accommodated

MC Service Levels

- All of LaRC's MC seats are subscribed to Return-to-Service within 8 Business Hours
- All MC seats are subscribed to 18-month Hardware Refresh
- Service Plans:

% of MC Seats	# Minutes / Month
97%	500 voice / unlimited data
2%	850 voice / unlimited data
0.5%	1200 voice / unlimited data
0.5%	no voice / unlimited data

% of MC Seats	# Text Messages / Month
50%	None
12%	50
31%	100
6%	1000
1%	2500

- 87% are CONUS only
- 13% allow International calling

ODIN Cell Phones

- 164 ODIN Cell Phones
- Service-provider is Verizon
- Current devices offered
  - Motorola VU204
  - TXT8010 (Blitz)
  - Requirements for other models/capabilities can be accommodated

Cell Phone Service Levels

- Return to Service (RTS)
  - 98% of Cell Phones are subscribed to RTS within 8 business hours
  - 2% of Cell Phones are subscribed to RTS within 4 business hours
- All Cell Phones are subscribed to 18-month Hardware Refresh
- Service Plans:

% of Cell Phones	# Voice Minutes / Month
97.6%	500
1.8%	850
0.6%	1200

% of Cell Phones	# Text Messages / Month
68%	None
8%	50
18%	100
6%	1000

- 98% are CONUS only
- 2% support International calling

National Aeronautics and Space Administration

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Office of the Chief Information Officer

John Evans

May 5, 2009

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LaRC Communication Environment

- Langley's network is known as LaRCNet
  - This is inclusive of the cables, switches, routers, network servers, and management devices
  - It also extends logically to locations where Langley managed IP addresses are utilized
- LaRCNet is an integrated data communication system
- LaRCNet is designed as a Core/Distribution/Access network
- Currently managed as part of the ODIN contract
- Cisco is the primary Routing and Switching hardware vendor

LaRC Communication Environment

- LaRCNet transports all mission and administrative data for the Center
- Supports ~4000 users
- Over 9000+ connections
- Over 180+ diverse buildings
- Cable Plant
  - 3 main fiber hubs provide fiber connectivity to LaRC buildings
  - Fiber runs are mainly Single mode, although some multi-mode is still used in some buildings
  - Copper Cabling is almost exclusively Cat5e
    - All copper cabling was installed and tested per existing standards

Cable Plant

- Steam Tunnel infrastructure enables much of our cabling between buildings

NISN Gateway

- WAN connectivity is provided by NISN
- Redundant physical paths to the Center exist

LaRC Communication Environment

- All network activity at LaRC is managed by the OCIO
- Relevant Network Information
  - 10 Gigabit Ethernet core
  - OSI Layer 2/3 Switches > 500
  - Wireless Access Points > 130
  - Internal T1 Bridge links > 10

LaRC Communication Environment

- LaRCNet consists of an Internal and External component
  - Internal refers to the collection of cables and electronics that reside on the inside or protected side of the Center firewall
  - External refers to the collection of cables and electronics that provide physical connectivity for all External LaRCNet devices – DMZ's and the Wireless and Guest Network (WaGN)
- Multiple DMZ's exist
  - Specific to the purpose or protection criteria
  - Requirements of the customer and information dictate which DMZ is appropriate

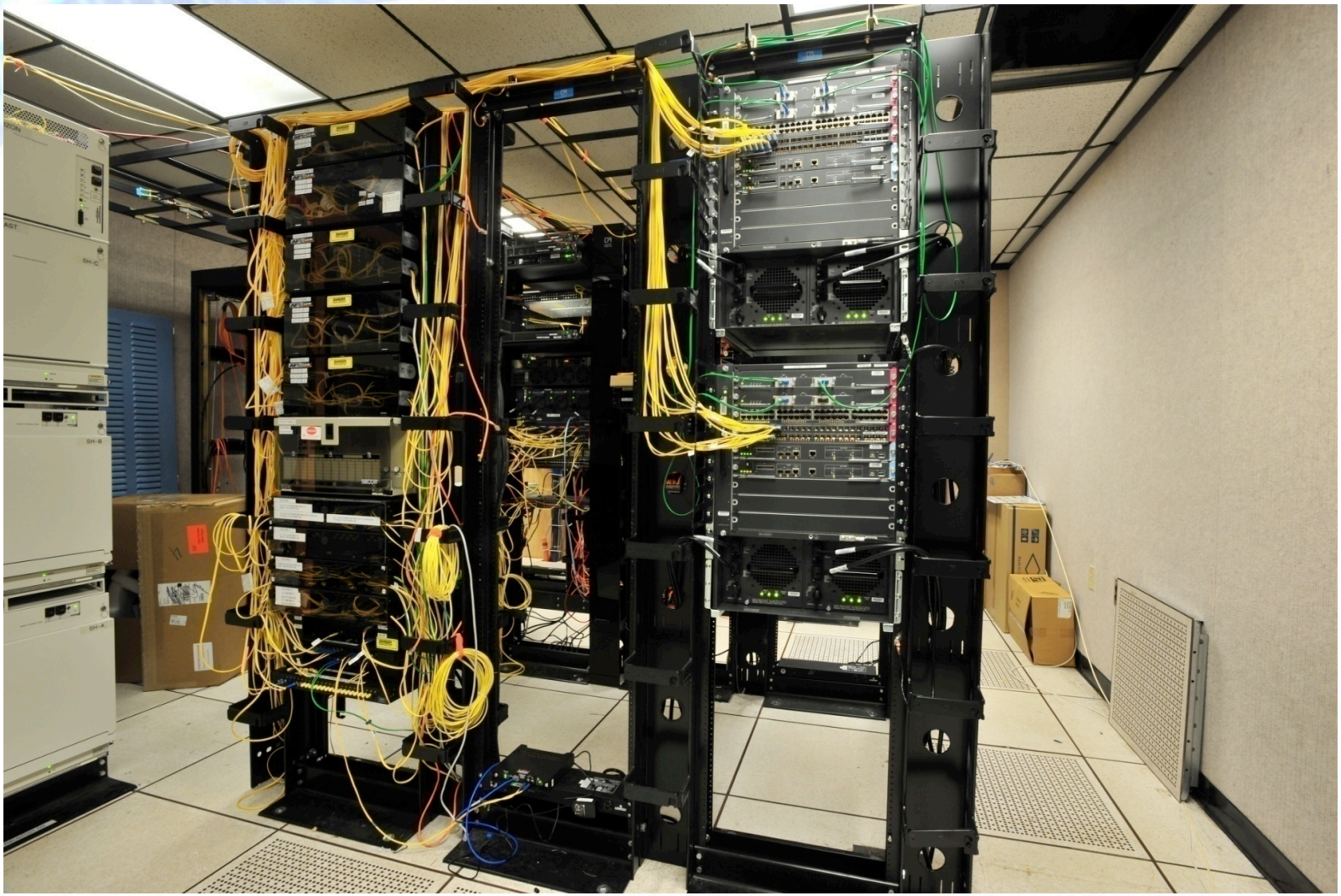
LaRC Communication Environment

- Firewall
  - Cisco ASA system
  - 10 Gigabit interface to the internet and internal LaRCNet
  - 1 Gigabit connections to each DMZ
  - Rule base of approximately 5550 rules
  - Web filtering provided by our 8e6 Technologies© device
- Virtual Private Network (VPN)
  - Cisco solution
  - Average number of users = 100 ~~ Peak users = 200
- Wireless and Guest Network (WaGN)
  - WaGN is an External LaRCNet network that provides a connectivity option for guests, foreign nationals, and users of 802.11b/g wireless enabled devices

LaRC Communication Environment

- A multitude of “one-off” network situations exist
  - These are all managed by the OCIO office at LaRC
  - These are often “Special Project” or activity related
  - Customized networking solutions to meet specific mission or project requirements
  - Examples
    - Mars Exploration Vehicle (MEV)
    - Robotics Lab
- Wind Tunnel Networks
  - Sub-networks that provide transport for the control and data acquisition sections of the Center’s Wind Tunnels.
  - These sub-networks are front-ended by firewalls
  - 6 wind tunnel networks with integration between tunnels

Main Communication Building Fiber Connections



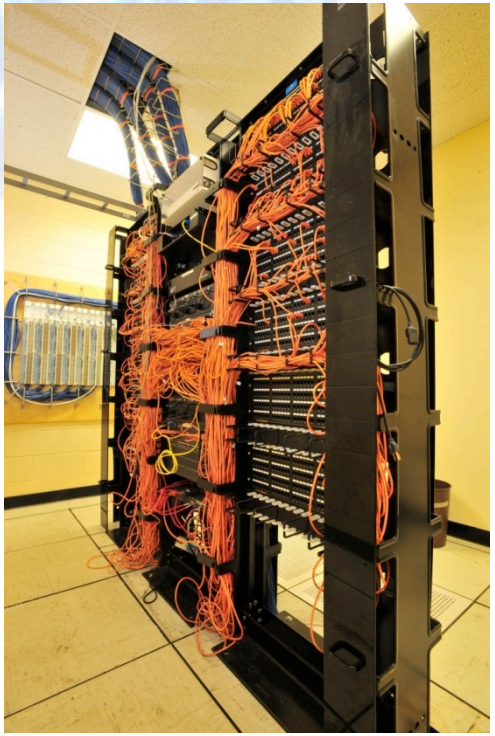
Main Communication Building Fiber Connections (continued)

- Controlled environment
- Generator backup
- Conditioned power
- Managed environment

Network Operations Center (NOC)

- Designed for network monitoring and response management
- LaRCNet has historically had an average uptime of 99.985%

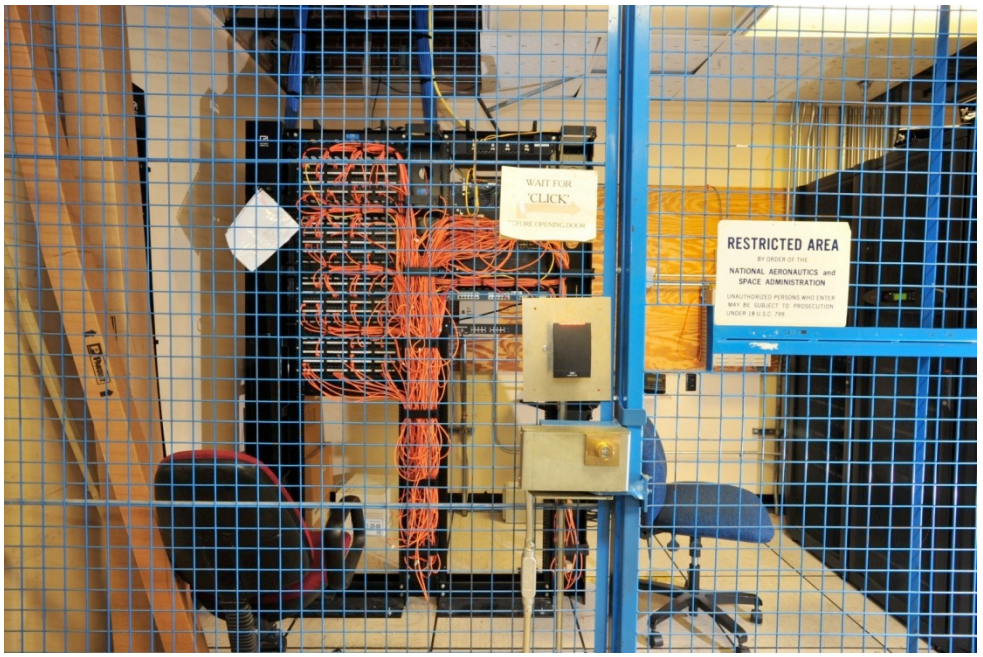
Communication Rooms - examples



- Typical/optimal communication rooms with phone and network connections

Communication Rooms - examples

- Some rooms are in shared areas therefore secured to ensure integrity of network security



Network Lab

- Network lab configured to enable development of solutions to meet changing needs and test new architecture additions

LaRC Phone Environment

- Recent project to replace 20 year old Rolm phone system with new Nortel CS1000M Multi-Group system
- 99.7% complete with regard to handset replacement
- 5500+ handset environment
- 1350 analog ports
- Three diverse telephone switch rooms

LaRC Phone Environment

- Telephone Main Distribution Frame (MDF) in main communication building
- Dual Rolm and Nortel transition scenario shown

LaRC Phone Environment

- New Nortel CS1000M phone switch in Main Communication building

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LaRC Data Center Environment

- The data center environment at LaRC consists of a main complex, Building 1268, that houses multiple computing functions:
  - Central Server environment provides web, database and application housing and hosting
  - Mid-range compute capabilities
  - Atmospheric Data Center facility provide Distributed Active Archive Center (DAAC) facilities for the Archive Next Generation (ANGe) project
- Several satellite facilities for specific compute capacity exist across the Center where it makes sense from a physical/facility and logical perspective

LaRC Data Center Environment

- The Central Server environment
- Serves over 200+ Center websites and applications as well as Agency applications:
  - Agency Website Registration System (AWRS)
  - Workforce Information Mgmt. System (WIMS)
  - Development, Test, Production environments

LaRC Data Center Environment

- The Central Server environment is a multi-platform environment
  - OS's
    - Windows
    - Linux
    - Solaris
  - Web Servers
    - Apache
    - iPlanet
  - Databases
    - Oracle
    - MySQL

LaRC Data Center Environment

- Cluster computing capacity at the Center provides for activities such as CFD modeling, simulation, and engineering compute needs
- 3000 cores here and 10,000+ cores at the Center
-

LaRC Data Center Environment

- The ANGe project is a product of the LaRC Science Directorate developing a more efficient means to manage the growing 2 petabytes of information crucial to Earth Science research
- ANGe ingests, archives and distributes Science data and is also able to create data products and give status reports.
- This is not in the scope of the NEDC activity but is informational due to the network activity and impact that this system creates.

LaRC Data Center Environment

- The Central Storage System (CSS)
  - Currently maintains backups for center specific data requirements
  - Central Servers and IT Security utilize for disaster recovery as well as policy requirement
  - Currently have 1.2 Petabytes of storage capacity
  - Utilizes one of the “one-off” network configurations to enable better network utilization and better backup performance

LaRC I3P Site Visit Summary

- *Thank you for coming to visit Langley Research Center*
- *Charts briefed today will be posted to the I3P web-site*
- *We encourage you to provide LaRC specific comments and questions, as well as general comments and questions, to the I3P website: http://i3p.nasa.gov*

Center Tour

- *Board the same bus you came in on*
- *Tour host will provide a 30 - 45 min. driving tour of the Center*
- *No contract related questions during the driving tour*
- *You may ask general questions about the Center and facilities*
- *Upon completion of driving tour you will be returned to your vehicles parked at the Speedway*